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REMARKS

Applicant appreciates the thorough examination of the present application as evidenced by the Office Action. Applicant submits that the rejections should be withdrawn as the claims are patentable over the cited art for the reasons discussed below.

The Section 102 Rejection

Claims 1, 6, 8-10, 35-36, 40, 42 and 44 stand rejected under 35 U.S.C. § 102(e) as being anticipated by United States Patent No. 6,183,097 to Saif et al. ("Saif"). Applicant submits that these rejections should be withdrawn at least as, contrary to the assertion of the Office Action, Saif does not disclose a thermally actuated single crystalline microactuator as will be discussed below.

Under 35 U.S.C. § 102, "a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." M.P.E.P. § 2131 (quoting *Verdegaal Bros. v. Union Oil Co.*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987)). "The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" M.P.E.P. § 2112 (citations omitted) (emphasis added).

A finding of anticipation further requires that there must be no difference between the claimed invention and the disclosure of the cited reference as viewed by one of ordinary skill in the art. *See Scripps Clinic & Research Foundation v. Genentech Inc.*, 18 U.S.P.Q.2d 1001 (Fed. Cir. 1991). Thus, anticipation requires that a single prior art reference disclose each and every element of the anticipated claim.

Independent Claim 1 recites a "thermally actuated microactuator ... comprised of a

single crystalline material." The Office Action asserts that Saif discloses a "thermally actuated micro actuator (100, 116) disposed on said substrate; and comprised of a single crystalline material. (Office Action, p. 2). However, the beams 100, 116 of Saif are not described as being thermally actuated. Instead, an actuator 120 provides a mechanical displacement force to the beam 116 to buckle beam 116. In turn, the buckling of beam 116 applies an axial force to buckle the beam 100. (Saif, Figures 10-13; Col. 8, line 22 to Col. 9, line 33).

The actuators 120 may be "capacitive comb-drive structures or any desired micro-actuator for supplying axial compressive forces to the beams 100 and 102. For example, other actuator elements such as those which exhibit physical properties responsive to temperature ... or any other measurable parameter may be used." (Saif, Col. 8, lines 52-58). Thus, while Saif does indicate that the actuator 120 may be thermally responsive, the beams 100, 116 are mechanically driven by an axial force from the actuator 120. However, Saif does not disclose or suggest that the actuator 120 be made from a single crystal silicon, just the beams 100, 102, 116, 118. (Saif, Col. 8, lines 29-30). Therefore, Saif does not teach a microactuator of a single crystalline material that is thermally actuated as recited in Claim 1. The distinction between Saif and the thermally actuated microactuator of the present invention is further illustrated by, for example, dependent Claims 7 and 8, which each recite that the "microactuator is thermally activated by ... heating thereof" Accordingly, the rejection of Claim 1 should be withdrawn for at least these reasons.

Amended independent Claim 35 contains similar recitations to those discussed above with reference to Claim 1. Accordingly, the rejection of Claim 35 should be withdrawn for substantially the same reasons as discussed above with reference to Claim 1. The dependent claims are patentable at least based on the patentability of the independent claims. Therefore, the rejections under Section 102 should be withdrawn for at least these reasons.

The Section 103 Rejections

Claims 2 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Saif in view of United States Patent No. 5,796,152 to Carr et al. ("Carr"). Claims 11 and 43

stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Saif in view of United States Patent No. 5,881,198 to Haake ("Haake"). The Office Action relies on Carr as disclosing, among other things, a "micro actuator being thermally activated by internal heating thereof." (Office Action, p. 6). Applicant submits that the references cannot be combined in the manner relied on in the Office Action for the rejections of the dependent claims or to overcome the deficiencies of the Section 102 rejections as discussed above.

To establish a prima facie case of obviousness, the prior art reference or references when combined must teach or suggest *all* the recitations of the claim, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. M.P.E.P. § 2143. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. M.P.E.P. § 2143.01, citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). To support combining references, evidence of a suggestion, teaching, or motivation to combine must be **clear and particular**, and this requirement for clear and particular evidence is not met by broad and conclusory statements about the teachings of references. *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). The Court of Appeals for the Federal Circuit has also stated that, to support combining or modifying references, there must be **particular** evidence from the prior art as to the reason the skilled artisan, with no knowledge of the claimed invention, **would have selected these components for combination in the manner claimed**. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000). Respectfully, as will be discussed below, the Office Action fails to meet the requirements for a showing of obviousness under § 103.

The Office Action relies on Carr as disclosing, among other things, a "micro actuator being thermally activated by internal heating thereof." (Office Action, p. 6). Applicant submits, however, that Carr cannot properly be combined with Saif to arrive at the present invention. Carr describes a cantilevered microstructure that includes a cantilevered arm having layers of different materials to allow application of an electrical signal to cause flexure of the arm to make an electrical contact. (Carr, Col. 2, line 63 to Col. 3, line13). Thus, Carr

describes an actuator structure as contrasted with a sensor device and, further, teaches away from a single crystalline material structure as the different materials are used to provide thermal activation.

In contrast, Saif is directed to motion amplification based sensors. Thus, the focus of Saif is not on mechanical actuation but, instead, is on enhanced sensitivity of the structure by using amplification to allow detection of small movements more readily. (Saif, Col. 1, lines 20-65). The sensing aspect of Saif is provided generally by the selection of the actuator 58, 80, 120. As stated in Saif, "[s]ensors for a wide variety of measureable parameters may be made using the micromotion amplification described above." (Saif, Col. 6, lines 36-38). Saif particularly suggests actuators "which exhibit physical properties responsive to temperature, pressure, humidity, impact or acceleration." (Saif, Col. 6, lines 7-9, Col. 8, lines 52-58). The single crystal silicon beams 100, 102, 116, 118 of Saif are selected to provide amplification through buckling, not to provide the sensing responsive physical properties, as they are activated to buckle responsive to axial forces. (Saif, Col. 8, lines 29-30; Figures 10-13).

Thus, there is no motivation for one of skill in the art to combine Carr with the amplification based sensors of Saif. Even were these references properly combined, if anything, one of skill in the art would use the cantilevered microstructure of Carr as a thermally activated version of the actuator 120 of Saif. Saif only discusses thermal sensitivity as a possibility for its actuator 120, not for its beams 100, 102, 116, 118. Furthermore, as Saif expressly states that its beams 100, 102, 116, 118 are "preferably fabricated of single crystal silicon," one of skill in the art would clearly not be motivated to use the structure of Carr as the beam 100, 102, 116, 118 of Saif. Accordingly, the rejections should also be withdrawn for at least these additional reasons as the claims are also not obvious in light of the combination of Saif and Carr.

The dependent claims are all patentable at least based on the patentability of the claims from which they depend. Furthermore, various of the dependent claims are separately patentable. For example, Claim 2 has been amended to clarify the relation between the two metallic structures as, illustrated, for example, by the structures 32, 34 of Figure 1 of the present specification. The Office Action relied on Carr as teaching the recitations of Claim 2.

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(Office Action, p. 5). Applicant submits that Carr does not disclose or suggest the structure recited in amended Claim 2. Accordingly, the rejection of Claim 2 should be withdrawn for at least these additional reasons.

Claim 9 has also been amended to clarify the relation between the plurality of arched beams as illustrated, for example, by the structures 22, 24, 26 of Figure 1 of the present specification. The Office Action cites to Saif as showing "a plurality of arched beams (116, 100) coupled together (Figure 5)." (Office Action, p. 3). Applicant submits that the beams 116, 100 of Saif do not disclose or suggest the recitations of amended Claim 9. Accordingly, the rejection of Claim 9 should be withdrawn for at least these additional reasons.

Conclusion

Applicant respectfully submits that, for the reasons discussed above, the references cited in the present rejections do not disclose or suggest the present invention as claimed. Accordingly, Applicant respectfully requests allowance of all the pending claims and passing this application to issue.

Respectfully submitted,




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Carey Gregory

Date of Signature: February 19, 2003

VERSION WITH CHANGES INDICATED

In the Claims:

Please replace Claims 2, 9 and 35 with the following.

2. (Amended) A microelectromechanical device according to Claim 1 wherein said at least one metallic structure comprises two metallic structures displaced from each other along an axis of movement of the microactuator.

9. (Amended) A microelectromechanical device according to Claim [1] 6 wherein said microactuator comprises a plurality of arched beams coupled together by the actuator member and extending between the spaced apart supports in substantially parallel alignment.

35. (Amended) A microelectromechanical device comprising:
a microelectronic substrate;
a microactuator disposed on said substrate and comprised of a single crystalline material, said microactuator being at least one of a thermally actuated microactuator and an electrostatic microactuator; and

at least one metallic structure disposed on said substrate adjacent said microactuator and on substantially the same plane, wherein said microactuator is adapted to operably contact said at least one metallic structure in response to actuation thereof.

Please cancel Claim 36 without prejudice.